

# Section 4

## PENNSYLVANIA STATE-WIDE WASTE COMPOSITION

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### Interpretation of Results

This section provides a detailed summary of the aggregate composition of Pennsylvania's disposed waste stream. Within the section are many graphical and tabular summaries of State-wide waste composition. To adequately interpret these data, it is important to have a layman's understanding of the statistical analysis that was used to generate the results.

### Aggregation of Data

Over 1,500 samples of waste were physically sorted or visually characterized for this study. Preparing the results for the study involved multiple steps of analyzing and aggregating these samples. The State-wide results presented here actually represent several layers of statistical analysis and aggregation. The process for estimating all of the results are described below:

- **Step 1 – Demographic- and generator-specific results by region:** Separately calculate the mean composition, standard deviation, confidence intervals, and measures of sampling error for *each generating sector* and *each demographic area* within *each of the six regions* in the State. There were a total of 36 results sets calculated in this step (2 generating sectors x 3 demographic areas x 6 regions). Regional results are shown in Sections 7 through 12 of this report.
- **Step 2 – Aggregate regional totals:** Aggregate the results of Step 1 based on a weighted average percentage of disposed tons from each generating sector and from each demographic area within each region. This step yielded another six results sets (one in each of the six jurisdictions). The results of this step are also summarized in Sections 7 through 12.
- **Step 3 – State-wide results by generating sector and by demographic origin:** For each generating sector and each demographic area, aggregate the regional total results based on the percentage of disposed waste from each region. This step yielded the State-wide composition estimates for the six combinations of generating sector and demographic area (e.g., “residential urban”, etc.). State-wide results by generating sector and by demographic area are shown in this section.
- **Step 4 – Aggregate State-wide results:** This step involves aggregating the State-wide generator/demographic results (from Step 3) into the Statewide aggregate composition. The results of this step are the focal point of the study, and are also shown in this section.

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### Statistical Measures

Within each of the results sets described above, this report presents several statistical measures. These are described below:

**Sample Mean** – The sample mean composition is the average composition of each material category (or material group) for the samples included in a given results set. Because it is conceptually easy to understand, the sample mean values are often cited as a definitive estimate of the actual mean (i.e., the mean of the entire population). It is important to remember that the sample mean has associated uncertainty, described below.

**Standard Deviation** – The standard deviation measures the level of dispersion of the underlying data around the sample mean. Higher standard deviation indicates the individual data points are more widely variant (i.e., spread across a wider range) compared to lower standard deviation.

**Confidence Intervals** – The lower and upper confidence intervals indicate the likelihood that the population mean (i.e., the composition of the entire waste stream) falls close to the sample mean (i.e., the samples analyzed in the study). The lower and upper bound throughout this report have been calculated at a 90 percent level of confidence. In layman's terms, this means we can be 90 percent confident that the fraction of this material in the overall population falls between the lower and upper bound shown. The inverse is also true—that there is a ten percent chance that the true mean falls outside the intervals. For example, the sample mean composition of all Paper in the State is 33.3 percent. We can be 90 percent confident that the fraction of Paper in the State's waste stream falls between 31.7 percent and 34.9 percent.

**Sampling Error** – Although not a formal definition from a statistical standpoint, this measure has been created to compare the width of the confidence intervals to the mean composition. Confidence intervals are not equidistant from the mean—because of the statistical methods used, the lower bound is generally closer to the sample mean than the upper bound. The sampling error is therefore calculated as one-half the total width of the confidence intervals [i.e.,  $\frac{1}{2} \times (\text{upper bound} - \text{lower bound})$ ] divided by the sample mean.

Several other concepts are helpful in evaluating the statistical measures above. The standard deviation by itself is not intuitively meaningful. However, the ratio of standard deviation (SD) to the mean (M) can be used to evaluate whether or not the underlying data exhibits normal distribution. Normal distribution of the underlying data assures us that the mean and confidence intervals shown are statistically unbiased.

Generally, as long as the ratio of standard deviation to mean is less than 2 ( $SD/M < 2$ ), we can be reasonably sure that the underlying data falls within a normal distribution. Most categories in the study exhibit a normal distribution. For example, the ratio of standard deviation to mean for Paper in Pennsylvania is 0.6 ( $20.0/33.3=0.6$ ). This suggests most of the samples contained between 31.7 and 34.9 percent Paper, and that Paper is common in almost all State waste.

Conversely, a ratio of standard deviation to mean that is greater than 2 indicates a non-normal distribution. The impact of such a situation is best explained via an example: In the study, yard waste was divided into two categories: grass and all other yard waste. Grass was found to make up a mean of 1.4 percent of the State's waste stream. The standard deviation of the proportion of Grass in the waste stream is 3.9 percent. The ratio of standard deviation to mean in the case of Grass is 2.8 ( $3.9/1.4=2.8$ ). As discussed above, this suggests that Grass is not disposed consistently in all loads delivered in the State, but when it is disposed, it is in a relatively large quantity. Material categories that

are characterized by infrequent samples containing large quantities of that category are said to exhibit non-normal distribution.

Non-normal distribution alone does not necessarily imply that statistical bias is introduced into the results. Statistical bias will only occur in cases where the non-normally distributed material makes up a significant part of the waste stream. When evaluating the impact of non-normally distributed materials, it is generally only necessary to focus on those materials that make up more than one percent of the waste stream. In the aggregate Statewide results, the non-normally distributed materials include yard waste and the range of organic and inorganic materials associated with construction and renovation waste, such as Painted and Unpainted Wood, Drywall, Carpet, and Other C&D. These types of waste do not appear in large amounts in most samples, but are extremely prevalent in a relatively small number of samples. These materials were also large enough fractions of the overall waste stream to potentially introduce a low level of bias into the sort results. However, due to the extensive number of samples (over 1,500) taken to derive that number, it is also reasonable to rely on the results as being reasonably representative of the State waste stream as a whole.

### **Pennsylvania Aggregate Disposed MSW Composition Results**

The remainder of this section provides a range of graphical and tabular summaries of the composition of disposed waste in Pennsylvania. Figures and tables are included at the end of this section, but described below.

Figure 1 presents the aggregate composition of major material groups in Pennsylvania's disposed waste stream. As shown, Organics and Paper make up the largest fractions of the waste stream, followed by Inorganics, Plastic, Metals and Glass. This overall breakdown tracks with the composition of waste in most other areas of the country. Figure 2 shows a bar graph of the actual tons of Pennsylvania waste that are estimated to be disposed in the State's landfills (based on 2001 facility reports). In absolute terms, over 3.2 million tons of Organics and 3.1 million tons of Paper were disposed in 2001.

Figure 3 focuses on the quantity of Act 101-specified materials that were disposed. As shown, Corrugated Cardboard, Newspaper, and even High Grade Office Paper were found to be disposed in significant quantities in Pennsylvania, with recyclable containers at relatively lower disposal rates. This suggests that the residential recycling programs that target containers and some paper grades have been successful in recycling many of these materials prior to disposal. However, Corrugated Cardboard and High Grade Paper, which are predominantly generated in the commercial generating sector, appear to remain in the disposed waste stream and could be targeted for future diversion.

Figure 4 lists the top ten individual materials that were most prevalent in the Statewide disposed waste stream. Statewide, Food Waste makes up the largest fraction of disposed waste at 12.0 percent, followed closely by Non-recyclable Paper (9.3 percent), Corrugated Cardboard (8.4 percent), Unpainted Wood (5.8 percent) and Film Plastic (5.0 percent). No other materials make up more than 4.8 percent of the State-wide waste stream. The top ten most prevalent materials make up 61.7 percent of the disposed waste stream.

Finally, Table 1 presents a detailed statistical summary of the composition of disposed MSW in Pennsylvania.

### Comparisons by Demographic Origin and Generating Sector

An objective of the study was to differentiate the composition and quantity of disposed waste by demographic area and by generating sector. This section provides a series of tables and figures with such comparisons.

Figure 5 compares the composition of waste by material group from urban, suburban and rural areas of the State. As shown, urban areas were found to have lower Glass, Metals, and Inorganics fractions, but the highest fractions of Paper, Organics and Plastic. Interestingly, rural areas have the lowest fraction of Paper, but the highest fraction of Glass, Metals and Inorganics. Table 2 presents detailed mean composition percentages for all materials in the urban, suburban, and rural waste streams.

The pie charts in Figures 6 and 7 compare the composition percentage by material group for residential waste versus commercial waste in Pennsylvania. Although disposed waste composition from the two generating sectors is relatively comparable, the differences are statistically significant. The residential stream has less Paper, Plastics, and Inorganics, but significantly higher Organics. The difference in Organics is driven largely by yard waste, textiles and diapers, which are far more prevalent in the residential waste stream. The difference in Inorganics is driven almost entirely by a lower fraction of other C&D materials in the residential stream. Residential waste also contains a higher percentage of Glass and Metals. Although it was beyond the scope of this project to determine the cause of the difference, the composition data suggests that there may be more glass and steel containers in the residential stream that drive the higher occurrence of these items in disposed residential waste.

Figure 8 compares the actual tons disposed from each generating sector (based on an allocation of 2001 facility reports). Note that some of the difference between residential and commercial waste quantities is due to there being more residential waste in the disposed waste stream State-wide.

Figure 9 compares the quantity of materials defined in Act 101 that are being disposed from the residential and commercial waste streams. Note that the recyclable containers typically associated with residential recycling programs are being disposed in relatively small quantities. Only newspaper, which is also commonly collected in residential recycling programs, appears to be getting disposed in large quantities. Interestingly, the most commonly disposed material defined in Act 101—corrugated cardboard—is primarily coming from the commercial sector. This is also the case for high grade office paper. Such findings suggest that additional diversion opportunities exist for these materials in the commercial sector.

Figures 10 and 11 compare the ten most prevalent residential materials and the ten most prevalent commercial materials. It is of interest to note that food waste is the most commonly disposed material in the residential sector, while corrugated cardboard is the most common commercial disposed material. Food waste ranks third in the commercial sector, contributing to its position as the State's most commonly disposed material. Five other materials—non-recyclable paper, corrugated cardboard, other C&D, unpainted wood, film plastic, and mixed paper—appear in the top ten in both generating sectors. In the residential sector, the top ten materials make up 58.7 percent of all disposed waste, while in the commercial sector the top ten contribute 69.0 percent.

Tables 3 and 4 provide detailed statistics, including composition percentages and absolute quantities, for all materials for the residential and commercial waste streams, respectively.

Figures 12 and 13 divide the disposed waste stream by demographic origin. Figure 12 compares the composition of urban, suburban, and rural residential waste by major material group. It is of interest to note that urban areas have the lowest percentage of paper, plastic, glass, and metals. Although beyond the scope of this study to determine the cause, it is likely that the State's residential recycling programs—which are more extensive in urban and suburban areas, are diverting more of these wastes in urban and suburban areas compared to rural areas. Figure 13 shows an opposite trend in terms of the percentage of paper, plastic, and glass being disposed. Disposed fractions of these materials are higher in urban areas and lower in rural areas.

Detailed statistical results for the residential and commercial waste streams by demographic origin are shown in Tables 5 and 6, respectively.

### **Bulky Waste Composition**

The study methodology allowed for bulky material loads to be visually surveyed for inclusion in the overall waste composition results. The final two figures in this section provide a summary of the composition of bulky waste loads (typically open top roll-offs and commercial contractor self-haulers).

Figure 14 presents a pie chart of the composition of bulky waste loads. Note that Organics and Inorganics are the most prevalent material in these loads. This is because of the high occurrence of C&D-related materials such as painted and unpainted wood in Organic waste, and other C&D material in the Inorganics.

This is shown more clearly in Figure 15. Other C&D and unpainted wood are the two most prevalent bulky materials by a significant margin. Cardboard, painted wood, and other ferrous metals are also common, but no other material was found to make up more than five percent of bulky loads.

### **Conclusion**

The aggregate Pennsylvania disposed MSW composition shown in this section highlights the percentages and quantities of materials that are still being disposed in the State's landfills and resource recovery facilities. Solid waste planners can use these results to better target the materials from specific generating sectors and demographic areas that have the highest potential for meaningful diversion. Sections 6 through 11 of this report provide comparable results for each of the State's six regions.

Section 4

Figure 1  
Pennsylvania Statewide Aggregate Disposed MSW Composition

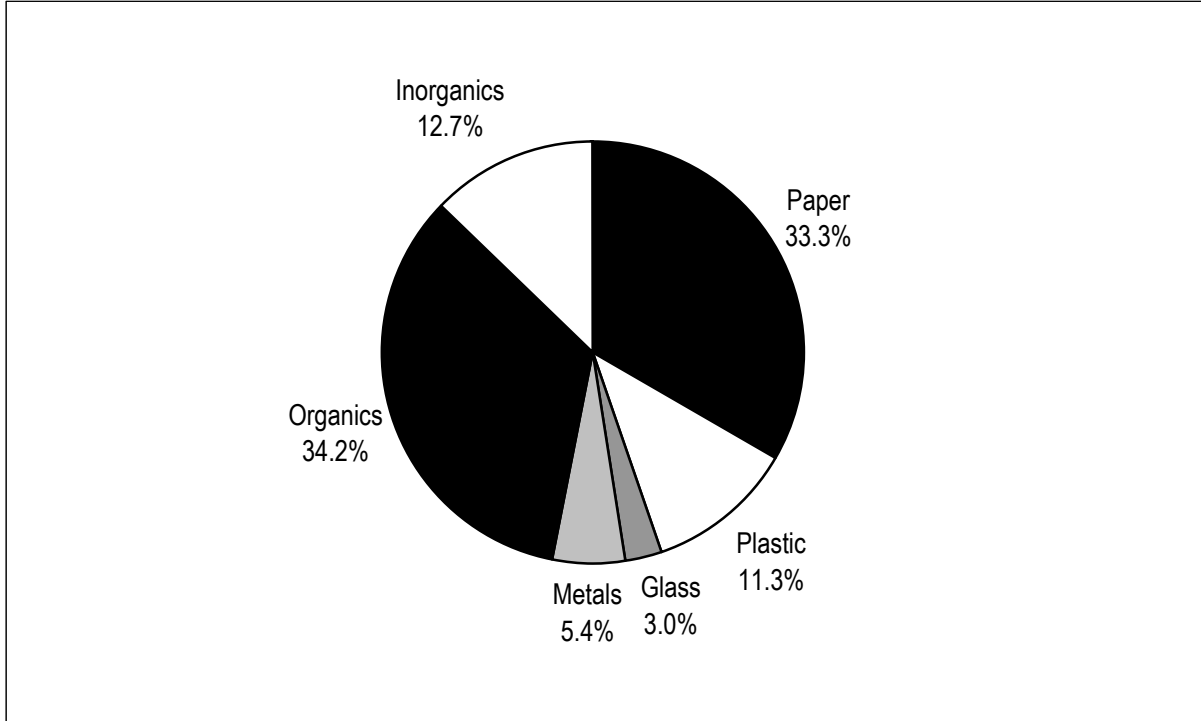
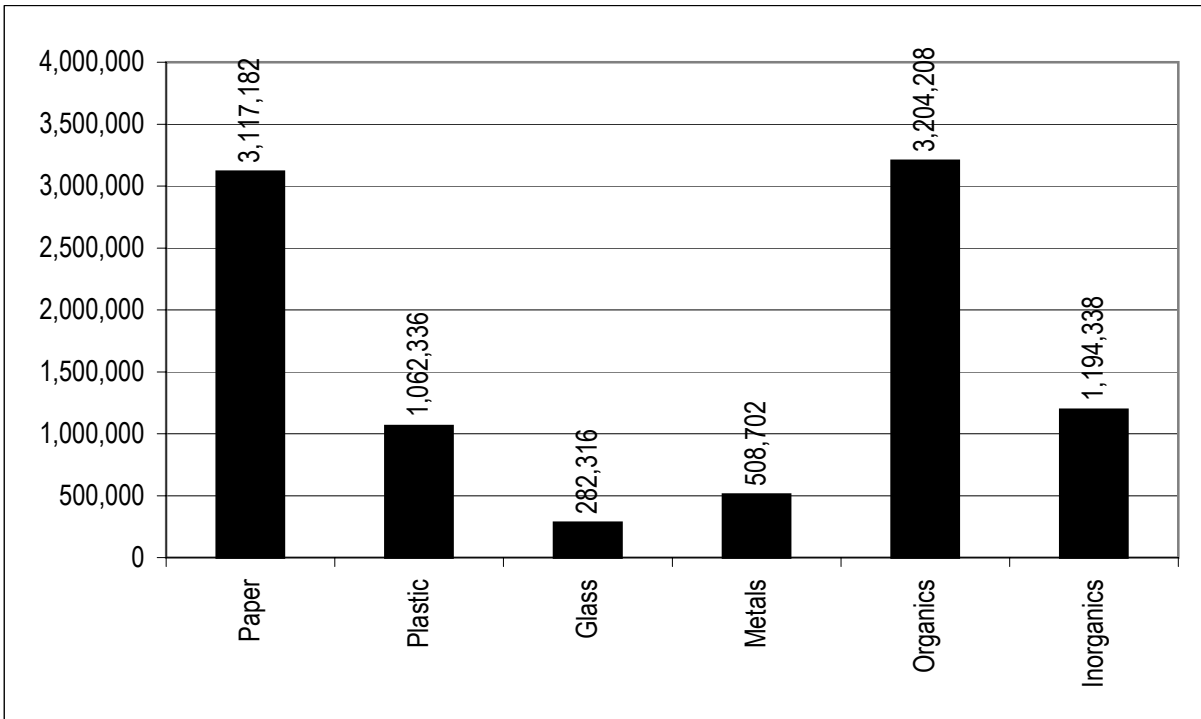
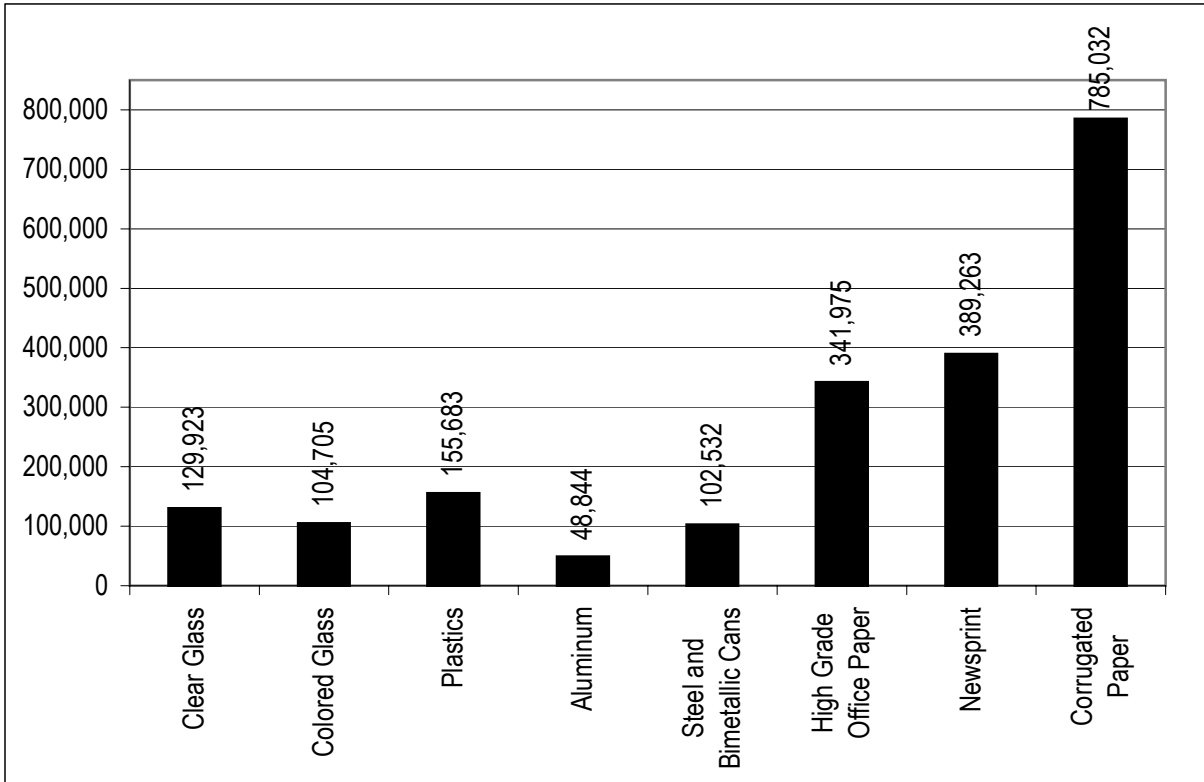


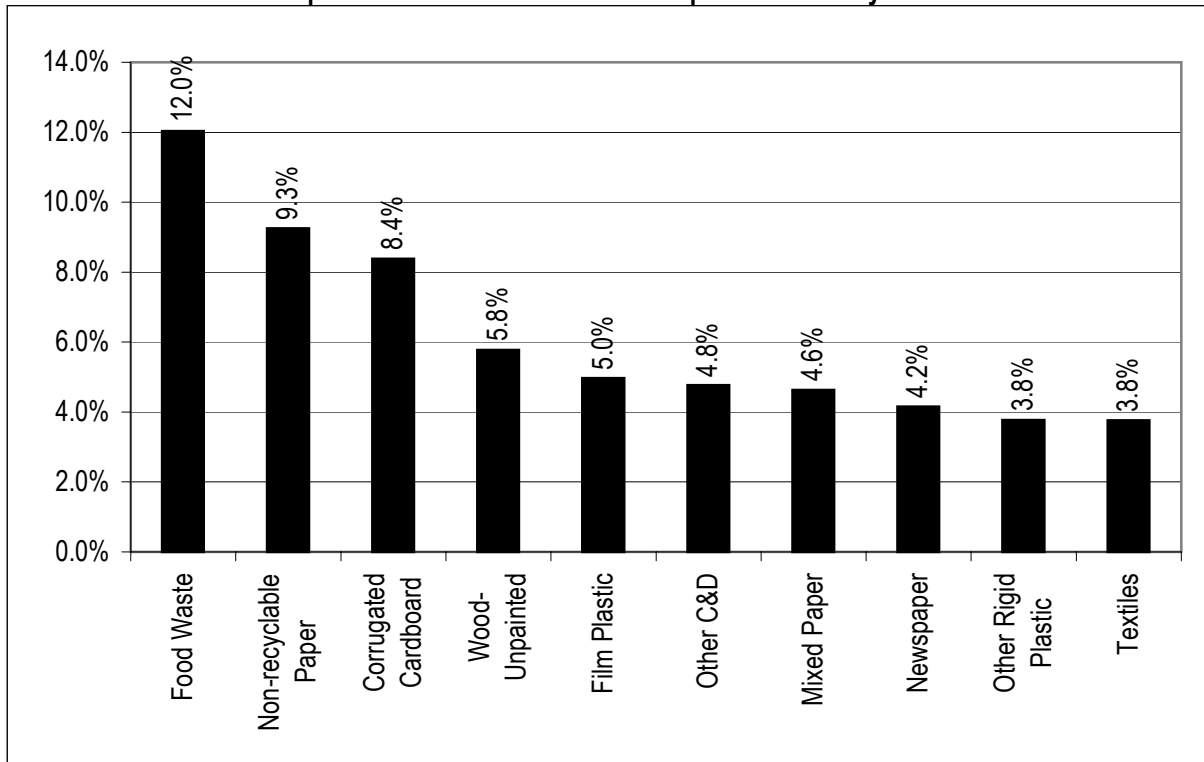
Figure 2  
Statewide Aggregate MSW Tons Disposed



**Figure 3**  
**Act 101 Recyclables in Disposed MSW (tons)**



**Figure 4**  
**Top 10 Most Prevalent Materials Disposed in Pennsylvania**

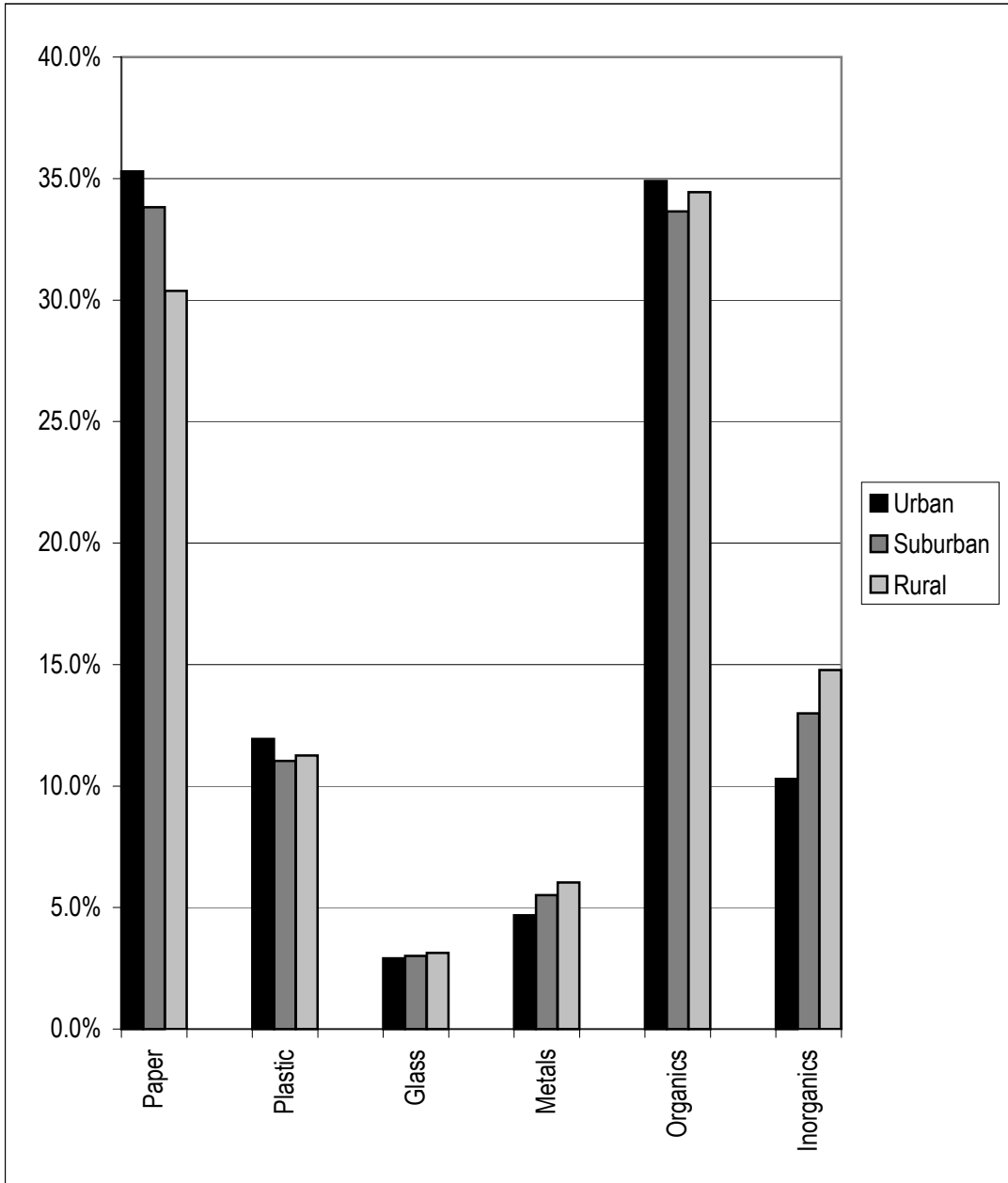


**Table 1  
Statewide Aggregate Landfilled MSW Composition Detail (Weight Percent)**

	Material Categories	Tons Disposed	Mean Composition	Standard Deviation	Confidence Interval		Sampling Error
					Lower (%)	Upper (%)	
Paper		<b>3,117,182</b>	<b>33.3%</b>	<b>20.0%</b>	<b>31.7%</b>	<b>34.9%</b>	<b>4.9%</b>
	1 Newspaper	389,263	4.2%	4.4%	3.9%	4.5%	8.2%
	2 Corrugated Cardboard	785,032	8.4%	10.7%	7.7%	9.3%	9.2%
	3 Office	341,975	3.7%	5.7%	3.3%	4.2%	13.0%
	4 Magazine/ Glossy	251,027	2.7%	4.1%	2.4%	3.1%	14.4%
	5 Polycoated/Aseptic Containers	49,074	0.5%	1.2%	0.5%	0.6%	13.3%
	6 Mixed Paper	433,821	4.6%	5.0%	4.3%	5.1%	7.8%
	7 Non-recyclable Paper	866,990	9.3%	7.5%	8.7%	10.0%	6.7%
Plastic		<b>1,062,336</b>	<b>11.3%</b>	<b>9.2%</b>	<b>10.7%</b>	<b>12.1%</b>	<b>6.3%</b>
	8 #1 PET Bottles	87,601	0.9%	1.4%	0.9%	1.0%	9.7%
	9 #2 HDPE Bottles	68,082	0.7%	0.8%	0.7%	0.8%	8.0%
	10 #3-#7 Bottles	16,871	0.2%	0.4%	0.2%	0.2%	16.2%
	11 Expanded Polystyrene	71,088	0.8%	1.5%	0.7%	0.9%	12.5%
	12 Film Plastic	465,586	5.0%	4.8%	4.7%	5.4%	7.1%
	13 Other Rigid Plastic	353,108	3.8%	5.1%	3.4%	4.2%	10.8%
Glass		<b>282,316</b>	<b>3.0%</b>	<b>5.3%</b>	<b>2.7%</b>	<b>3.4%</b>	<b>10.3%</b>
	14 Clear Glass	129,923	1.4%	2.0%	1.3%	1.5%	10.0%
	15 Green Glass	38,468	0.4%	1.1%	0.4%	0.5%	18.6%
	16 Amber Glass	66,238	0.7%	1.9%	0.6%	0.9%	23.6%
	17 Non-recyclable Glass	47,688	0.5%	2.1%	0.4%	0.6%	15.8%
Metals		<b>508,702</b>	<b>5.4%</b>	<b>8.6%</b>	<b>5.1%</b>	<b>5.9%</b>	<b>7.3%</b>
	18 Steel Cans	102,532	1.1%	1.3%	1.0%	1.2%	8.1%
	19 Aluminum Cans	48,844	0.5%	1.1%	0.5%	0.6%	12.7%
	20 Other Ferrous	282,131	3.0%	8.0%	2.7%	3.4%	12.1%
	21 Other Aluminum	43,057	0.5%	1.2%	0.4%	0.5%	10.4%
	22 Other Non-Ferrous	32,138	0.3%	1.4%	0.3%	0.4%	15.9%
Organics		<b>3,204,208</b>	<b>34.2%</b>	<b>21.7%</b>	<b>32.8%</b>	<b>35.7%</b>	<b>4.2%</b>
	23 Yard Waste- Grass	136,084	1.5%	3.9%	1.2%	1.8%	21.7%
	24 Yard Waste- Other	347,164	3.7%	8.2%	3.1%	4.6%	19.4%
	25 Wood- Unpainted	540,611	5.8%	15.8%	5.2%	6.7%	12.9%
	26 Wood- Painted	234,406	2.5%	8.6%	2.3%	2.9%	12.6%
	27 Food Waste	1,127,170	12.0%	11.8%	11.3%	13.1%	7.7%
	28 Textiles	352,570	3.8%	6.8%	3.5%	4.2%	9.8%
	29 Diapers	217,875	2.3%	4.1%	2.1%	2.6%	10.5%
	30 Fines	92,451	1.0%	1.3%	0.9%	1.1%	8.4%
	31 Other Organics	155,877	1.7%	4.1%	1.5%	1.9%	12.7%
Inorganics		<b>1,194,338</b>	<b>12.7%</b>	<b>23.2%</b>	<b>11.8%</b>	<b>13.9%</b>	<b>8.3%</b>
	32 Electronics	137,299	1.5%	4.3%	1.3%	1.8%	16.4%
	33 Carpet	163,371	1.7%	6.2%	1.5%	2.1%	17.4%
	34 Drywall	99,009	1.1%	6.1%	0.9%	1.3%	15.7%
	35 Other C&D	446,516	4.8%	16.0%	4.2%	5.5%	13.7%
	36 HHW	28,203	0.3%	1.2%	0.3%	0.4%	13.6%
	37 Other Inorganics	207,682	2.2%	5.9%	2.0%	2.6%	14.2%
	38 Furniture	112,258	1.2%	6.8%	1.0%	1.6%	25.5%
	Total	9,369,083	100.0%				

Figure 5

Landfilled Aggregate Waste Composition Results by Demographic Sector (Weight Percent)



Generator	% Composition			
	Urban	Suburban	Rural	Aggregate
Paper	35.3%	33.8%	30.4%	33.3%
Plastic	11.9%	11.0%	11.3%	11.3%
Glass	2.9%	3.0%	3.1%	3.0%
Metals	4.7%	5.5%	6.0%	5.4%
Organics	34.9%	33.6%	34.4%	34.2%
Other Waste	10.3%	13.0%	14.8%	12.7%
Total	100.0%	100.0%	100.0%	100.0%

**Table 2**  
**Landfilled Aggregate MSW Composition Detail by Demographic Sector (Weight Percent)**

	Material Categories	Urban	Suburban	Rural	Aggregate
Paper		<b>35.3%</b>	<b>33.8%</b>	<b>30.4%</b>	<b>33.3%</b>
	1 Newspaper	3.6%	4.5%	4.1%	4.2%
	2 Corrugated Cardboard	10.5%	7.8%	7.2%	8.4%
	3 Office	4.3%	3.9%	2.6%	3.7%
	4 Magazine/ Glossy	3.4%	2.5%	2.4%	2.7%
	5 Polycoated/Aseptic Containers	0.5%	0.5%	0.5%	0.5%
	6 Mixed Paper	4.7%	4.8%	4.2%	4.6%
7 Non-recyclable Paper	8.2%	9.8%	9.4%	9.3%	
Plastic		<b>11.9%</b>	<b>11.0%</b>	<b>11.3%</b>	<b>11.3%</b>
	8 #1 PET Bottles	1.0%	0.9%	1.0%	0.9%
	9 #2 HDPE Bottles	0.5%	0.7%	0.9%	0.7%
	10 #3-#7 Bottles	0.2%	0.2%	0.1%	0.2%
	11 Expanded Polystyrene	0.8%	0.8%	0.7%	0.8%
	12 Film Plastic	4.9%	4.9%	5.1%	5.0%
13 Other Rigid Plastic	4.5%	3.5%	3.4%	3.8%	
Glass		<b>2.9%</b>	<b>3.0%</b>	<b>3.1%</b>	<b>3.0%</b>
	14 Clear Glass	1.4%	1.3%	1.4%	1.4%
	15 Green Glass	0.5%	0.4%	0.3%	0.4%
	16 Amber Glass	0.7%	0.8%	0.6%	0.7%
17 Non-recyclable Glass	0.3%	0.5%	0.7%	0.5%	
Metals		<b>4.7%</b>	<b>5.5%</b>	<b>6.0%</b>	<b>5.4%</b>
	18 Steel Cans	0.9%	1.0%	1.5%	1.1%
	19 Aluminum Cans	0.5%	0.5%	0.5%	0.5%
	20 Other Ferrous	2.6%	3.3%	3.0%	3.0%
	21 Other Aluminum	0.4%	0.4%	0.6%	0.5%
22 Other Non-Ferrous	0.3%	0.3%	0.4%	0.3%	
Organics		<b>34.9%</b>	<b>33.6%</b>	<b>34.4%</b>	<b>34.2%</b>
	23 Yard Waste- Grass	0.4%	2.1%	1.4%	1.5%
	24 Yard Waste- Other	4.9%	4.3%	1.6%	3.7%
	25 Wood- Unpainted	6.6%	5.1%	6.1%	5.8%
	26 Wood- Painted	2.8%	2.1%	2.8%	2.5%
	27 Food Waste	12.4%	11.2%	13.1%	12.0%
	28 Textiles	3.7%	3.6%	4.0%	3.8%
	29 Diapers	1.9%	2.5%	2.5%	2.3%
	30 Fines	1.0%	0.9%	1.0%	1.0%
31 Other Organics	1.1%	1.9%	1.8%	1.7%	
Other Waste		<b>10.3%</b>	<b>13.0%</b>	<b>14.8%</b>	<b>12.7%</b>
	32 Electronics	1.4%	1.9%	0.8%	1.5%
	33 Carpet	1.1%	2.0%	1.9%	1.7%
	34 Drywall	1.1%	1.0%	1.1%	1.1%
	35 Other C&D	3.1%	4.6%	6.7%	4.8%
	36 HHW	0.3%	0.3%	0.3%	0.3%
	37 Other Inorganics	1.2%	2.7%	2.4%	2.2%
38 Furniture	2.0%	0.5%	1.5%	1.2%	
	Total	100.0%	100.0%	100.0%	100.0%

Figure 6

Statewide Residential MSW Composition

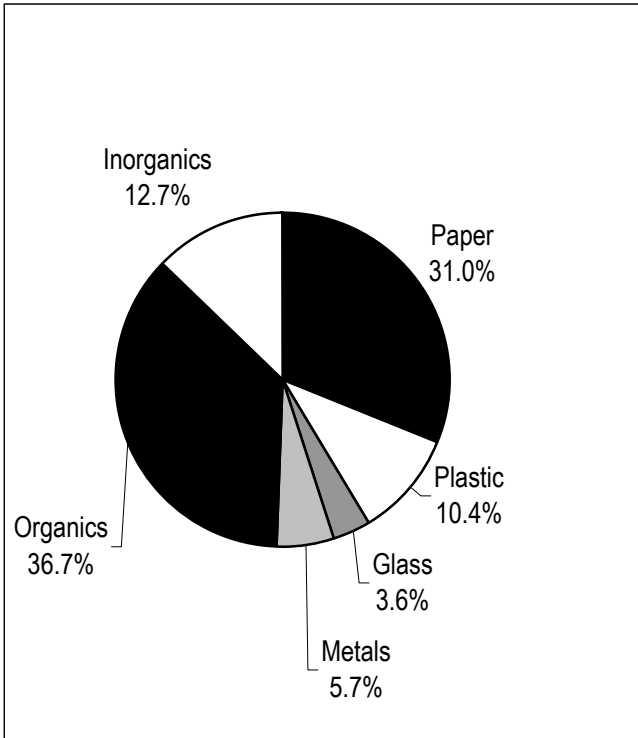


Figure 7

Statewide Commercial MSW Waste Composition

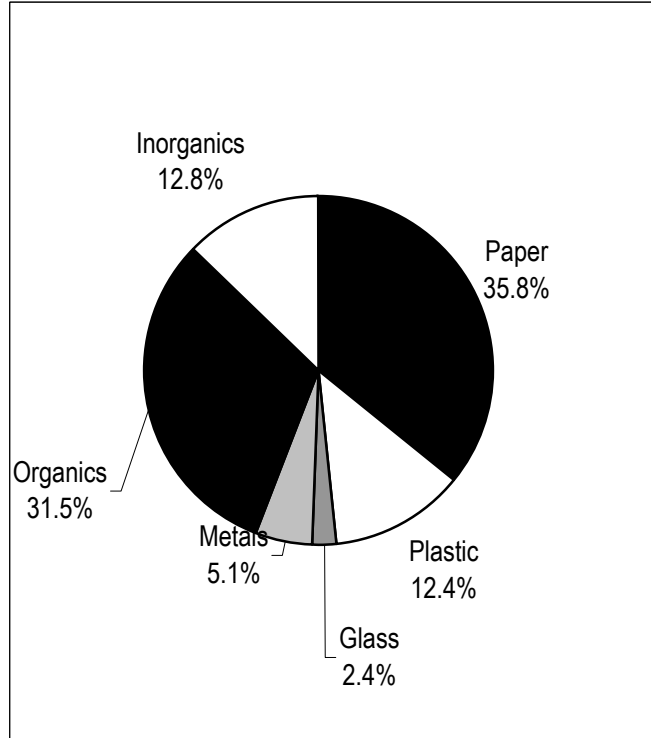
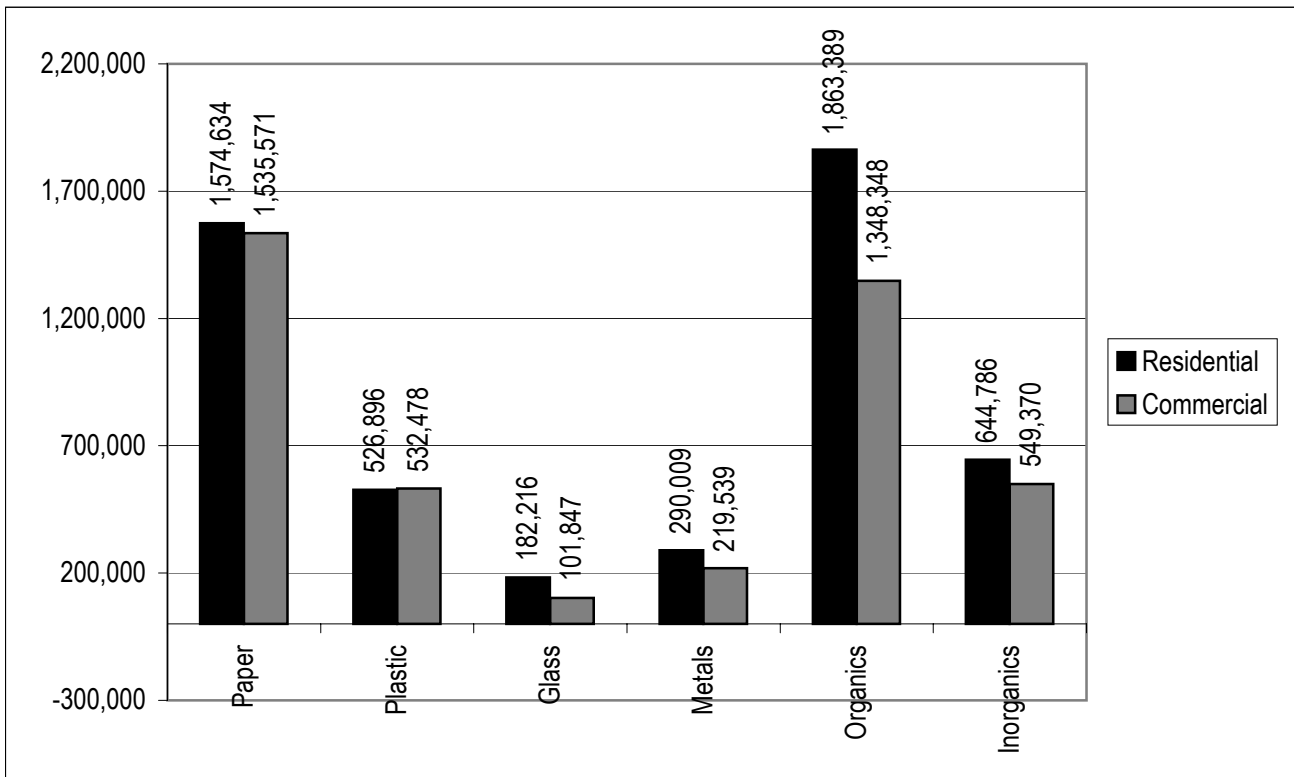
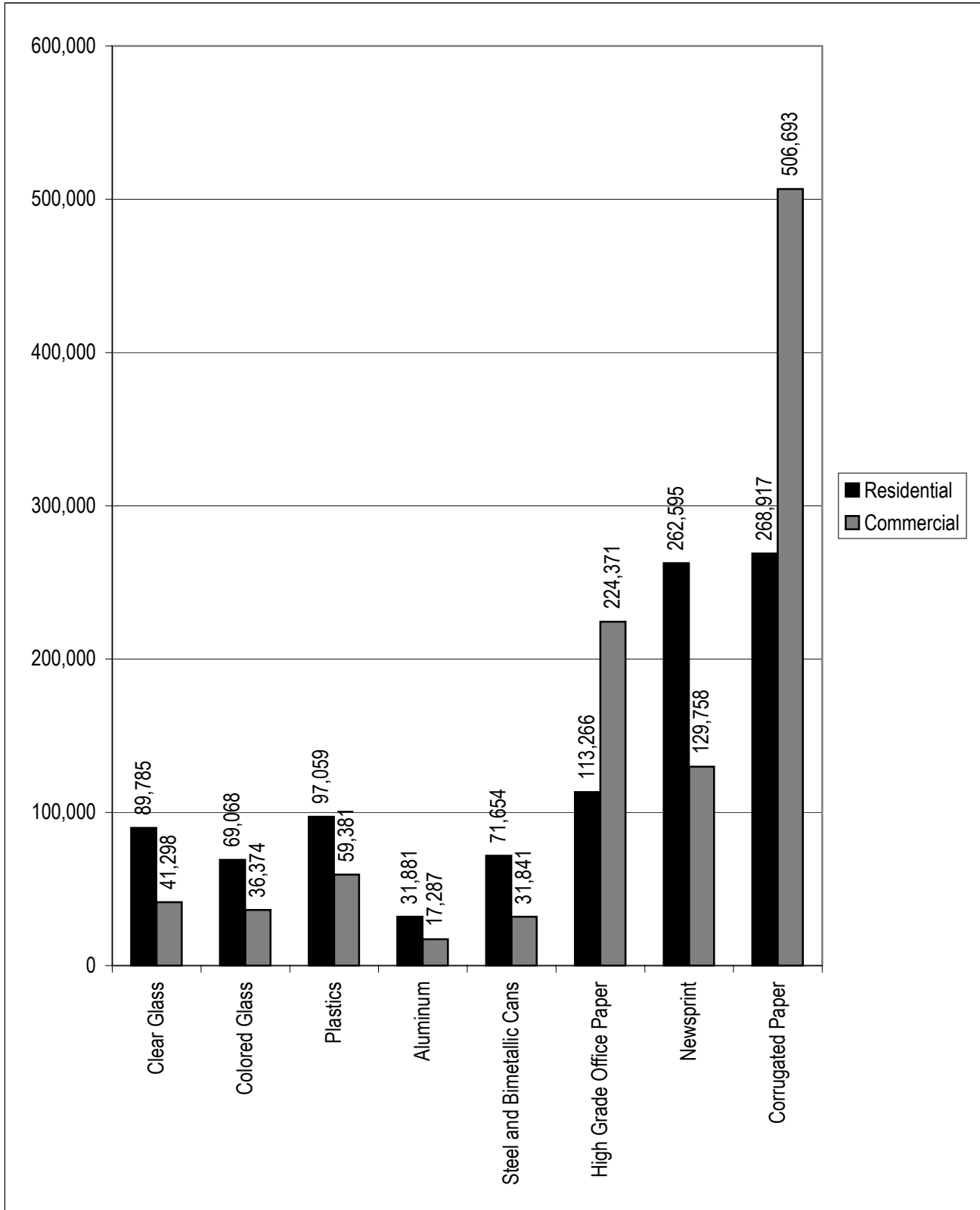


Figure 8

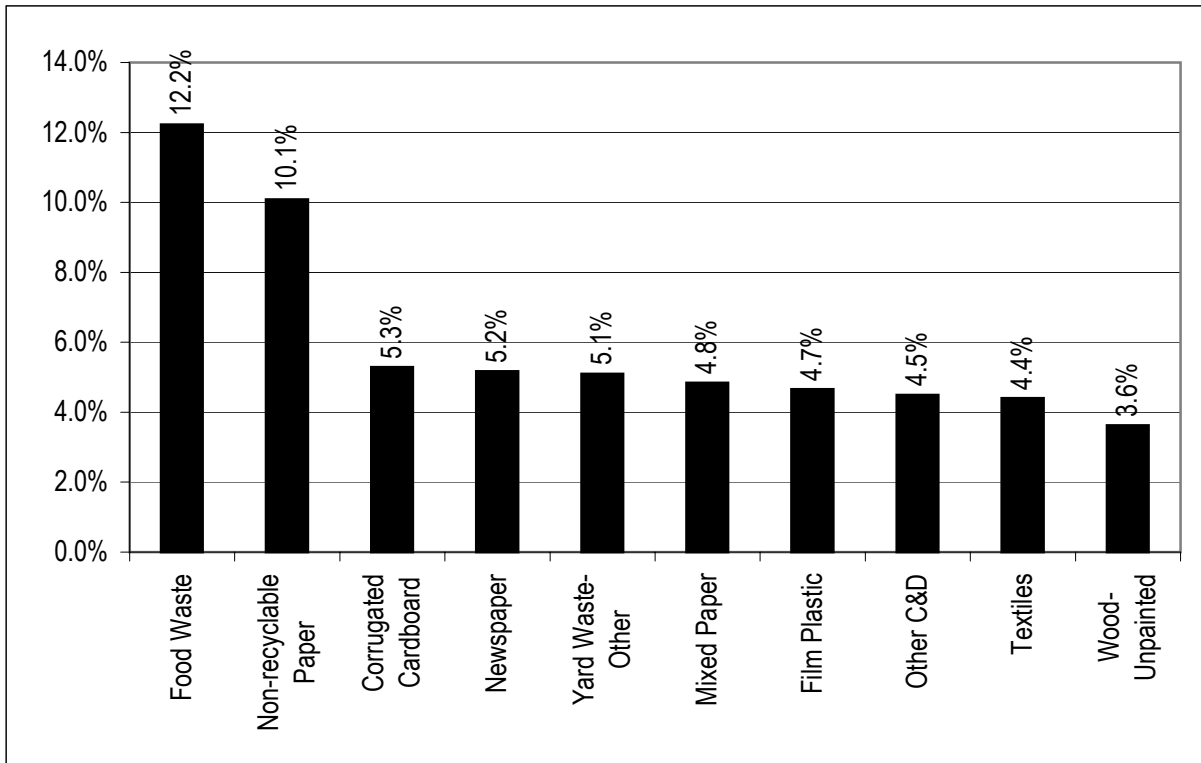
Residential and Commercial Aggregate MSW Tons Disposed



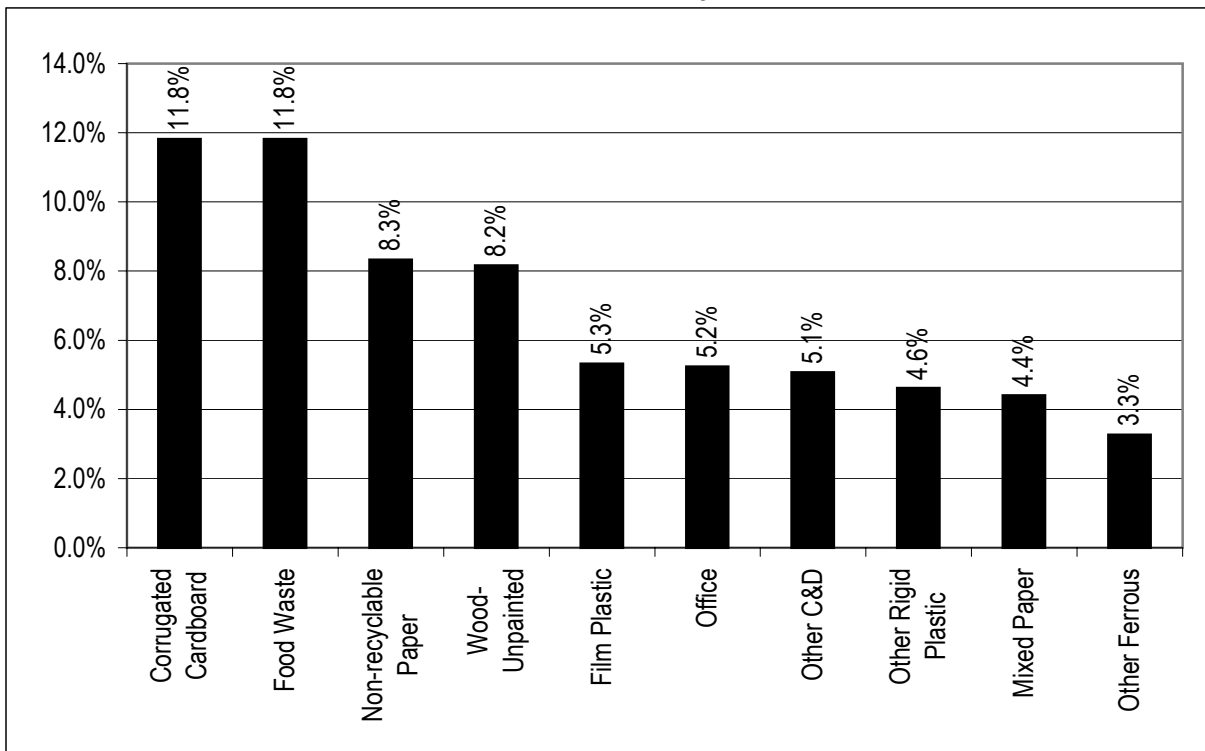
**Figure 9**  
**Act 101 Recyclables Disposed by Generating Sector (tons)**



**Figure 10**  
**Top 10 Most Prevalent Materials in Pennsylvania Residential Waste**



**Figure 11**  
**Top 10 Most Prevalent Materials in Pennsylvania Commercial Waste**



**Table 3  
Statewide Residential Aggregate Landfilled MSW Composition Detail (Weight Percent)**

	Material Categories	Tons Disposed	Mean Composition	Standard Deviation	Confidence Interval		Sampling Error
					Lower (%)	Upper (%)	
Paper		<b>1,574,634</b>	<b>31.0%</b>	<b>15.7%</b>	<b>29.4%</b>	<b>32.6%</b>	<b>5.2%</b>
	1 Newspaper	262,595	5.2%	4.3%	4.8%	5.7%	9.0%
	2 Corrugated Cardboard	268,917	5.3%	5.9%	4.8%	6.0%	11.5%
	3 Office	113,266	2.2%	3.8%	2.0%	2.6%	13.8%
	4 Magazine/ Glossy	146,754	2.9%	3.0%	2.6%	3.2%	10.3%
	5 Polycoated/Aseptic Containers	24,695	0.5%	0.9%	0.4%	0.6%	17.7%
	6 Mixed Paper	245,801	4.8%	3.7%	4.5%	5.3%	8.5%
	7 Non-recyclable Paper	512,605	10.1%	6.9%	9.4%	11.0%	7.5%
Plastic		<b>526,896</b>	<b>10.4%</b>	<b>6.1%</b>	<b>9.8%</b>	<b>11.0%</b>	<b>5.6%</b>
	8 #1 PET Bottles	49,262	1.0%	1.0%	0.9%	1.1%	9.8%
	9 #2 HDPE Bottles	47,797	0.9%	0.9%	0.9%	1.0%	9.4%
	10 #3-#7 Bottles	8,378	0.2%	0.3%	0.1%	0.2%	15.5%
	11 Expanded Polystyrene	32,204	0.6%	0.8%	0.6%	0.7%	9.9%
	12 Film Plastic	236,551	4.7%	3.4%	4.4%	5.0%	7.3%
	13 Other Rigid Plastic	152,705	3.0%	2.5%	2.8%	3.3%	7.5%
Glass		<b>182,216</b>	<b>3.6%</b>	<b>5.4%</b>	<b>3.2%</b>	<b>4.1%</b>	<b>13.0%</b>
	14 Clear Glass	89,785	1.8%	2.5%	1.6%	2.0%	12.1%
	15 Green Glass	22,988	0.5%	0.9%	0.4%	0.6%	22.5%
	16 Amber Glass	46,081	0.9%	2.2%	0.7%	1.3%	30.9%
	17 Non-recyclable Glass	23,363	0.5%	1.5%	0.4%	0.6%	17.7%
Metals		<b>290,009</b>	<b>5.7%</b>	<b>8.1%</b>	<b>5.2%</b>	<b>6.2%</b>	<b>8.8%</b>
	18 Steel Cans	71,654	1.4%	1.4%	1.3%	1.6%	9.4%
	19 Aluminum Cans	31,881	0.6%	1.3%	0.5%	0.7%	15.9%
	20 Other Ferrous	141,481	2.8%	7.3%	2.4%	3.3%	16.3%
	21 Other Aluminum	26,422	0.5%	1.3%	0.5%	0.6%	13.5%
	22 Other Non-Ferrous	18,571	0.4%	1.6%	0.3%	0.5%	21.5%
Organics		<b>1,863,389</b>	<b>36.7%</b>	<b>18.6%</b>	<b>35.1%</b>	<b>38.3%</b>	<b>4.5%</b>
	23 Yard Waste- Grass	125,403	2.5%	6.3%	2.0%	3.2%	23.4%
	24 Yard Waste- Other	259,161	5.1%	8.3%	4.3%	6.2%	18.9%
	25 Wood- Unpainted	184,131	3.6%	12.3%	3.1%	4.5%	19.1%
	26 Wood- Painted	139,868	2.8%	9.2%	2.4%	3.3%	17.3%
	27 Food Waste	621,205	12.2%	8.8%	11.4%	13.3%	7.8%
	28 Textiles	223,459	4.4%	5.4%	4.0%	4.9%	10.2%
	29 Diapers	135,128	2.7%	3.0%	2.4%	3.0%	10.5%
	30 Fines	64,113	1.3%	1.1%	1.2%	1.4%	8.9%
	31 Other Organics	110,920	2.2%	3.9%	1.9%	2.6%	15.6%
Inorganics		<b>644,786</b>	<b>12.7%</b>	<b>21.2%</b>	<b>11.4%</b>	<b>14.1%</b>	<b>10.5%</b>
	32 Electronics	71,102	1.4%	3.9%	1.2%	1.7%	19.7%
	33 Carpet	79,436	1.6%	5.6%	1.3%	2.0%	24.7%
	34 Drywall	49,627	1.0%	5.2%	0.8%	1.3%	24.4%
	35 Other C&D	228,167	4.5%	13.6%	3.8%	5.5%	18.3%
	36 HHW	15,198	0.3%	0.8%	0.3%	0.4%	14.9%
	37 Other Inorganics	127,096	2.5%	5.7%	2.1%	3.1%	19.8%
	38 Furniture	74,161	1.5%	7.3%	1.2%	1.9%	27.0%
	Total	5,081,930	100.0%				

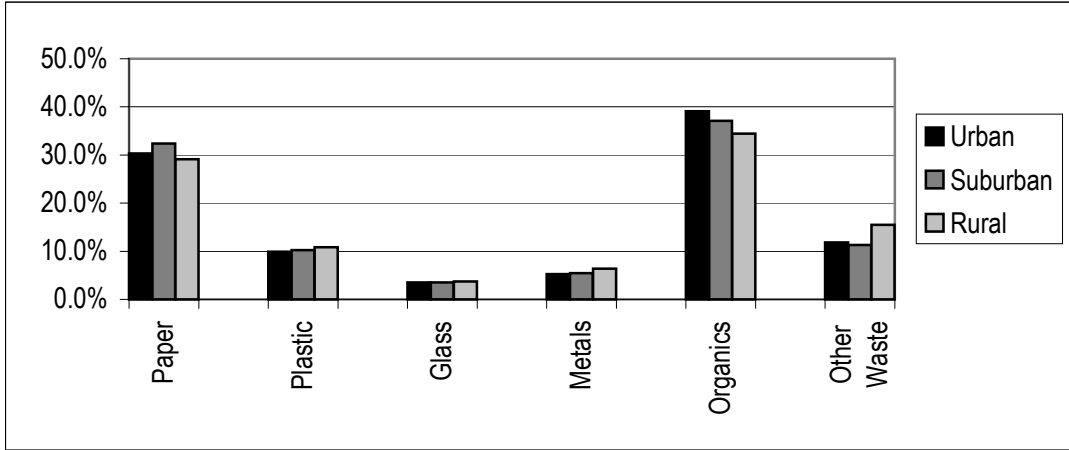
Table 4

## Statewide Commercial Aggregate Landfilled MSW Composition Detail (Weight Percent)

	Material Categories	Tons Disposed	Mean Composition	Standard Deviation	Confidence Interval		Sampling Error
					Lower (%)	Upper (%)	
Paper		<b>1,535,571</b>	<b>35.8%</b>	<b>25.2%</b>	<b>32.9%</b>	<b>38.9%</b>	<b>8.3%</b>
	1 Newspaper	129,758	3.0%	4.6%	2.9%	3.2%	4.5%
	2 Corrugated Cardboard	506,693	11.8%	16.4%	11.2%	12.5%	5.4%
	3 Office	224,371	5.2%	7.9%	5.1%	5.4%	3.0%
	4 Magazine/ Glossy	104,909	2.4%	5.5%	2.4%	2.5%	2.8%
	5 Polycoated/Aseptic Containers	24,264	0.6%	1.6%	0.6%	0.6%	0.7%
	6 Mixed Paper	188,650	4.4%	6.5%	4.2%	4.6%	4.1%
	7 Non-recyclable Paper	356,927	8.3%	8.2%	7.5%	8.9%	8.1%
Plastic		<b>532,478</b>	<b>12.4%</b>	<b>12.8%</b>	<b>11.1%</b>	<b>14.0%</b>	<b>11.7%</b>
	8 #1 PET Bottles	38,444	0.9%	1.9%	0.9%	0.9%	0.9%
	9 #2 HDPE Bottles	20,938	0.5%	0.6%	0.5%	0.5%	0.9%
	10 #3-#7 Bottles	8,446	0.2%	0.6%	0.2%	0.2%	0.2%
	11 Expanded Polystyrene	38,503	0.9%	2.3%	0.9%	0.9%	0.7%
	12 Film Plastic	228,075	5.3%	6.5%	5.1%	5.5%	3.9%
	13 Other Rigid Plastic	198,072	4.6%	8.2%	4.5%	4.7%	2.6%
Glass		<b>101,847</b>	<b>2.4%</b>	<b>5.1%</b>	<b>2.0%</b>	<b>2.8%</b>	<b>16.7%</b>
	14 Clear Glass	41,298	1.0%	1.4%	0.9%	1.0%	2.1%
	15 Green Glass	15,607	0.4%	1.3%	0.4%	0.4%	0.7%
	16 Amber Glass	20,767	0.5%	1.6%	0.5%	0.5%	1.6%
	17 Non-recyclable Glass	24,175	0.6%	2.7%	0.6%	0.6%	1.0%
Metals		<b>219,539</b>	<b>5.1%</b>	<b>9.4%</b>	<b>4.5%</b>	<b>5.8%</b>	<b>12.4%</b>
	18 Steel Cans	31,841	0.7%	1.2%	0.7%	0.8%	1.3%
	19 Aluminum Cans	17,287	0.4%	0.8%	0.4%	0.4%	1.0%
	20 Other Ferrous	139,956	3.3%	8.9%	3.2%	3.5%	5.1%
	21 Other Aluminum	16,820	0.4%	1.0%	0.4%	0.4%	0.9%
	22 Other Non-Ferrous	13,635	0.3%	1.2%	0.3%	0.3%	1.0%
Organics		<b>1,348,348</b>	<b>31.5%</b>	<b>25.4%</b>	<b>29.1%</b>	<b>34.0%</b>	<b>7.8%</b>
	23 Yard Waste- Grass	13,779	0.3%	1.2%	0.3%	0.3%	4.3%
	24 Yard Waste- Other	92,257	2.2%	8.1%	2.1%	2.3%	6.5%
	25 Wood- Unpainted	349,928	8.2%	20.0%	7.8%	9.2%	8.6%
	26 Wood- Painted	95,302	2.2%	7.9%	2.1%	2.4%	6.6%
	27 Food Waste	506,554	11.8%	15.3%	10.5%	12.9%	10.1%
	28 Textiles	131,046	3.1%	8.4%	2.9%	3.2%	4.8%
	29 Diapers	83,765	2.0%	5.4%	1.9%	2.0%	2.7%
	30 Fines	29,177	0.7%	1.5%	0.7%	0.7%	1.1%
	31 Other Organics	46,540	1.1%	4.3%	1.1%	1.1%	3.0%
Inorganics		<b>549,370</b>	<b>12.8%</b>	<b>25.6%</b>	<b>11.3%</b>	<b>14.6%</b>	<b>12.9%</b>
	32 Electronics	65,994	1.5%	4.7%	1.5%	1.6%	2.7%
	33 Carpet	83,384	1.9%	6.9%	1.9%	2.1%	3.8%
	34 Drywall	49,137	1.1%	7.1%	1.1%	1.2%	3.4%
	35 Other C&D	217,507	5.1%	19.0%	4.8%	5.8%	9.5%
	36 HHW	12,999	0.3%	1.5%	0.3%	0.3%	0.6%
	37 Other Inorganics	81,454	1.9%	6.2%	1.9%	2.0%	4.2%
	38 Furniture	38,894	0.9%	6.2%	0.9%	1.0%	4.5%
	Total	4,287,153	100.0%				

Figure 12

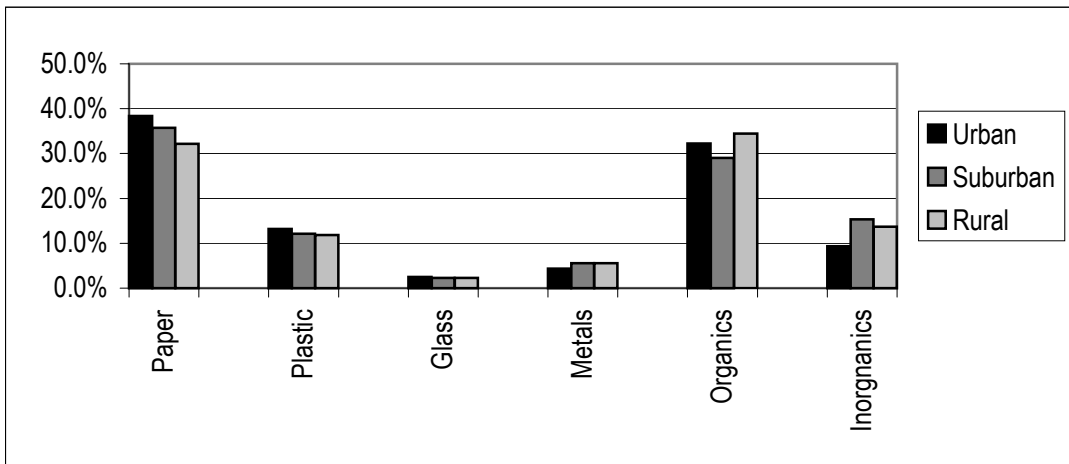
Landfilled Residential Waste Composition Results by Demographic Sector (Weight Percent)



Generator	% Composition			
	Urban	Suburban	Rural	Aggregate
Paper	30.3%	32.4%	29.1%	31.0%
Plastic	9.9%	10.2%	10.9%	10.4%
Glass	3.5%	3.5%	3.7%	3.6%
Metals	5.3%	5.5%	6.4%	5.7%
Organics	39.1%	37.1%	34.4%	36.7%
Other Waste	11.9%	11.3%	15.5%	12.7%
Total	100.0%	100.0%	100.0%	100.0%

Figure 13

Landfilled Commercial Waste Composition Results by Demographic Sector (Weight Percent)



Generator	% Composition			
	Urban	Suburban	Rural	Aggregate
Paper	38.4%	35.7%	32.2%	35.8%
Plastic	13.2%	12.1%	11.8%	12.4%
Glass	2.5%	2.3%	2.3%	2.4%
Metals	4.3%	5.5%	5.6%	5.1%
Organics	32.3%	29.0%	34.4%	31.5%
Other Waste	9.3%	15.3%	13.7%	12.8%
Total	100.0%	100.0%	100.0%	100.0%

Table 5

## Landfilled Residential Aggregate MSW Composition Detail by Demographic Sector (Weight Percent)

	Material Categories	Urban	Suburban	Rural	Aggregate
Paper		<b>30.3%</b>	<b>32.4%</b>	<b>29.1%</b>	<b>31.0%</b>
	1 Newspaper	4.7%	5.3%	5.2%	5.2%
	2 Corrugated Cardboard	5.2%	5.8%	4.5%	5.3%
	3 Office	2.3%	2.4%	1.9%	2.2%
	4 Magazine/ Glossy	2.4%	3.0%	3.0%	2.9%
	5 Polycoated/Aseptic Containers	0.4%	0.6%	0.4%	0.5%
	6 Mixed Paper	5.2%	5.2%	4.0%	4.8%
	7 Non-recyclable Paper	10.0%	10.1%	10.1%	10.1%
Plastic		<b>9.9%</b>	<b>10.2%</b>	<b>10.9%</b>	<b>10.4%</b>
	8 #1 PET Bottles	0.9%	0.9%	1.1%	1.0%
	9 #2 HDPE Bottles	0.8%	0.9%	1.1%	0.9%
	10 #3-#7 Bottles	0.2%	0.2%	0.2%	0.2%
	11 Expanded Polystyrene	0.7%	0.6%	0.6%	0.6%
	12 Film Plastic	4.7%	4.6%	4.7%	4.7%
	13 Other Rigid Plastic	2.6%	3.1%	3.1%	3.0%
Glass		<b>3.5%</b>	<b>3.5%</b>	<b>3.7%</b>	<b>3.6%</b>
	14 Clear Glass	2.1%	1.6%	1.8%	1.8%
	15 Green Glass	0.4%	0.5%	0.3%	0.5%
	16 Amber Glass	0.8%	1.1%	0.7%	0.9%
	17 Non-recyclable Glass	0.2%	0.3%	0.9%	0.5%
Metals		<b>5.3%</b>	<b>5.5%</b>	<b>6.4%</b>	<b>5.7%</b>
	18 Steel Cans	1.2%	1.2%	1.9%	1.4%
	19 Aluminum Cans	0.5%	0.6%	0.7%	0.6%
	20 Other Ferrous	2.6%	2.9%	2.7%	2.8%
	21 Other Aluminum	0.5%	0.4%	0.6%	0.5%
	22 Other Non-Ferrous	0.4%	0.3%	0.5%	0.4%
Organics		<b>39.1%</b>	<b>37.1%</b>	<b>34.4%</b>	<b>36.7%</b>
	23 Yard Waste- Grass	0.8%	3.4%	2.0%	2.5%
	24 Yard Waste- Other	6.7%	6.1%	2.4%	5.1%
	25 Wood- Unpainted	4.8%	2.9%	4.1%	3.6%
	26 Wood- Painted	4.6%	2.0%	2.7%	2.8%
	27 Food Waste	11.4%	12.0%	13.1%	12.2%
	28 Textiles	5.4%	4.4%	3.8%	4.4%
	29 Diapers	2.6%	2.6%	2.8%	2.7%
	30 Fines	1.5%	1.2%	1.2%	1.3%
	31 Other Organics	1.4%	2.5%	2.2%	2.2%
Other Waste		<b>11.9%</b>	<b>11.3%</b>	<b>15.5%</b>	<b>12.7%</b>
	32 Electronics	1.4%	1.7%	0.9%	1.4%
	33 Carpet	1.3%	1.7%	1.4%	1.6%
	34 Drywall	1.6%	0.9%	0.8%	1.0%
	35 Other C&D	4.0%	3.0%	7.2%	4.5%
	36 HHW	0.2%	0.3%	0.4%	0.3%
	37 Other Inorganics	1.5%	3.0%	2.4%	2.5%
	38 Furniture	1.9%	0.7%	2.5%	1.5%
	Total	100.0%	100.0%	100.0%	100.0%

**Table 6**

**Landfilled Commercial Aggregate MSW Composition Detail by Demographic Sector (Weight Percent)**

	Material Categories	Urban	Suburban	Rural	Aggregate
Paper		<b>38.4%</b>	<b>35.7%</b>	<b>32.2%</b>	<b>35.8%</b>
	1 Newspaper	2.9%	3.4%	2.5%	3.0%
	2 Corrugated Cardboard	13.8%	10.6%	11.0%	11.8%
	3 Office	5.5%	5.9%	3.6%	5.2%
	4 Magazine/ Glossy	4.0%	1.7%	1.5%	2.4%
	5 Polycoated/Aseptic Containers	0.6%	0.5%	0.6%	0.6%
	6 Mixed Paper	4.5%	4.3%	4.5%	4.4%
7 Non-recyclable Paper	7.1%	9.3%	8.5%	8.3%	
Plastic		<b>13.2%</b>	<b>12.1%</b>	<b>11.8%</b>	<b>12.4%</b>
	8 #1 PET Bottles	1.0%	0.8%	0.8%	0.9%
	9 #2 HDPE Bottles	0.4%	0.5%	0.6%	0.5%
	10 #3-#7 Bottles	0.2%	0.2%	0.1%	0.2%
	11 Expanded Polystyrene	0.9%	1.0%	0.7%	0.9%
	12 Film Plastic	5.0%	5.4%	5.7%	5.3%
13 Other Rigid Plastic	5.7%	4.1%	3.9%	4.6%	
Glass		<b>2.5%</b>	<b>2.3%</b>	<b>2.3%</b>	<b>2.4%</b>
	14 Clear Glass	1.0%	0.9%	1.0%	1.0%
	15 Green Glass	0.6%	0.2%	0.3%	0.4%
	16 Amber Glass	0.7%	0.3%	0.5%	0.5%
17 Non-recyclable Glass	0.3%	0.8%	0.5%	0.6%	
Metals		<b>4.3%</b>	<b>5.5%</b>	<b>5.6%</b>	<b>5.1%</b>
	18 Steel Cans	0.7%	0.7%	1.0%	0.7%
	19 Aluminum Cans	0.5%	0.3%	0.4%	0.4%
	20 Other Ferrous	2.6%	3.8%	3.4%	3.3%
	21 Other Aluminum	0.3%	0.4%	0.5%	0.4%
22 Other Non-Ferrous	0.3%	0.4%	0.3%	0.3%	
Organics		<b>32.3%</b>	<b>29.0%</b>	<b>34.4%</b>	<b>31.5%</b>
	23 Yard Waste- Grass	0.2%	0.3%	0.6%	0.3%
	24 Yard Waste- Other	3.8%	1.7%	0.5%	2.2%
	25 Wood- Unpainted	7.7%	8.1%	9.0%	8.2%
	26 Wood- Painted	1.7%	2.2%	3.0%	2.2%
	27 Food Waste	13.0%	10.0%	13.0%	11.8%
	28 Textiles	2.7%	2.6%	4.4%	3.1%
	29 Diapers	1.5%	2.3%	2.0%	2.0%
	30 Fines	0.7%	0.6%	0.7%	0.7%
31 Other Organics	1.0%	1.2%	1.2%	1.1%	
Inorganics		<b>9.3%</b>	<b>15.3%</b>	<b>13.7%</b>	<b>12.8%</b>
	32 Electronics	1.4%	2.2%	0.7%	1.5%
	33 Carpet	1.0%	2.4%	2.6%	1.9%
	34 Drywall	0.9%	1.1%	1.6%	1.1%
	35 Other C&D	2.5%	6.8%	6.0%	5.1%
	36 HHW	0.4%	0.2%	0.3%	0.3%
	37 Other Inorganics	1.1%	2.3%	2.5%	1.9%
38 Furniture	2.1%	0.3%	0.2%	0.9%	
	Total	100.0%	100.0%	100.0%	100.0%

Figure 14

Pennsylvania Aggregate Composition of Bulky Loads (Visual Samples)

Material Group	% Weight
Paper	12.4%
Plastic	2.1%
Glass	1.1%
Metals	7.0%
Organics	37.8%
Inorganics	39.6%
Total	100.0%

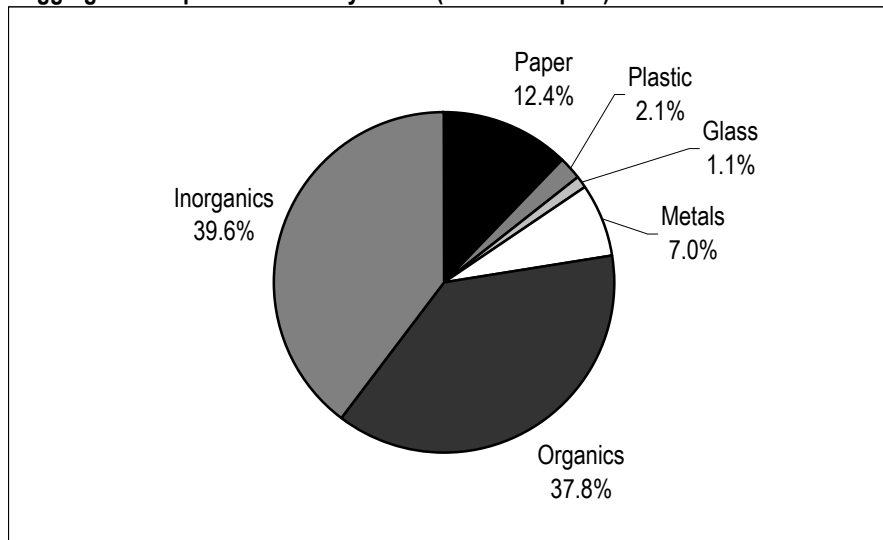


Figure 15

Pennsylvania Top 10 Most Prevalent Bulky Materials

